STATE OF NEW MEXICO
BEFORE THE ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED REGULATION
20.2.350 NMAC – *GREENHOUSE GAS CAP-AND-TRADE PROVISIONS* **No. EIB 10-04 (R)**

REBUTTAL TESTIMONY OF MARK FESMIRE, PE

Q. WHAT IS THE PURPOSE OF YOUR REBUTTALL TESTIMONY?

A. I am testifying on behalf of the New Mexico Environment Department in support of proposed NMAC 20.2.350 and in rebuttal to some of the statements made in the testimony of industry in two areas: (1) my experience with implementing environmental regulations that impact the oil and gas industry and the comparison of the actual costs and effect of those regulations on economic activity in the oil field with that predicted by industry representatives; and (2) the effect of implementing environmental regulations on investment decisions of oil and gas operators in New Mexico in a volatile commodity pricing environment.

I. BACKGROUND AND QUALIFICATIONS

Q. PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS.

A. My name is Mark E. Fesmire. I am currently employed as the Acting Chairman of the New Mexico Oil Conservation Commission (OCC), Acting Director of the New Mexico Oil Conservation Division (OCD), Acting State Petroleum Engineer and Attorney for the Energy Minerals and Natural Resources Department. I have held the first three positions in a direct or acting capacity for over 6 years.

I graduated from New Mexico State University in May of 1978 with degrees in Geological Engineering and Civil Engineering (Water Resources). After graduation, I began work as a petroleum engineer for Texaco Inc, then Anadarko Production Company and finally Wagner and Brown, Oil and Gas Producers. I spent a total of over 12 years as a petroleum engineer before attending law school. Most of my experience during that time was as a production or reservoir engineer where I created reserve and production rate estimates and use these estimates to analyze proposed investments and to calculate a value of oil or gas reserves in the ground.

During that period, I became a registered professional engineer in petroleum engineering in three states, including New Mexico, where I hold Registration No. 8552.

I also am a licensed attorney in the states of New Mexico and Texas, having graduated from the Texas Tech University School of Law in May of 1993. In law school, I concentrated in oil and gas law, water law and environmental law. During those studies, I received the Richard W. Hemmingway Presidential Scholarship in oil and gas law.

I became a licensed attorney in Texas in November of 1993 and practiced law there from 1993 to 1999, prior to moving to New Mexico in October of that year to accept a position as Bureau Chief of the Hydrographic Survey Bureau in the Legal Services Division of the Office of the State Engineer. In that position, I worked as a water resources engineer and water attorney for nearly 5 years prior to becoming the Director of the OCD in May of 2004. I also have taught oil and gas law at the University of New Mexico School of Law. My curriculum vitae is attached as NMED-Fesmire Rebuttal Exhibit 1.

II. IMPLEMENTING ENVIRONMENTAL REGULATIONS

Q. COULD YOU GIVE AN EXAMPLE OF YOUR EXPERIENCE WITH IMPLEMENTING ENVIRONMENTAL REGULATIONS THAT IMPACTED THE OIL AND GAS INDUSTRY, AND A COMPARISON OF THE ACTUAL COSTS AND EFFECT OF THOSE REGULATIONS ON ECONOMIC ACTIVITY IN THE OIL FIELD WITH THAT PREDICTED BY INDUSTRY REPRESENTATIVES?

A. Yes. Oil and gas drilling and production in New Mexico was causing ground water contamination near those operations. The data base of contamination cases showed several thousand "releases" of contaminate and over 800 cases of ground water contamination which had been caused by those releases and reported by the oil and gas operators. The OCD data base manager categorized the cases according to cause of contamination and reported on the results. This analysis showed that approximately half

of the cases (421) were caused by disposal of waste at sites that were generically called "pits", those excavations in the ground dug to temporarily hold oil field fluids or for permanent disposal of wastes. The other half of the cases were caused by one or more of several other reasons.

As a recent transfer from the legal division of the state water management agency, I had asked the Division to adopt an objective and motto of "no new water contamination due to oil and gas operations in the state." It appeared that a giant step towards that objective could be accomplished by correcting the problem with pits. Additionally, eliminating ongoing contamination for the new pits would minimize the number of "legacy pits" that would have to be addressed by remedial action, saving both the state and operators considerable expenditures.

I ordered a meeting of the Bureau Chiefs in the Oil Conservation Division (OCD) and asked what we could do to address this problem. I was informed that the OCD rules governing pits, below grade tanks and sumps were inadequate to protect the water.

We began discussing changes to the pit rule and soon came to the conclusion that there were other regulatory rule changes that had to be accomplished prior to changing the pit rule. First, there was no practical way under the rules for the OCD to enforce its regulations concerning less serious violations and second, even if we did require the operators to haul their wastes to proper disposal facilities, we had no rules to adequately regulate those disposal sites. What we did have was statutory authority to propose rules to the OCC, and it had the authority to promulgate those rules.

The Division initiated a rule making to create an enforcement capability within the OCD and OCC, and the OCC passed those "Enforcement and Compliance Rules." A

single operator appealed this decision to the District Court, the Court of Appeals, and the Supreme Court. The operator lost every issue except one which they won only at the Supreme Court level

Next, the OCD began the process of a second rule making to create a proposed set of rules to govern waste management facilities such as landfills and landfarms associated with oil and gas operations. These rules also passed the OCC and were appealed through the Supreme Court by a group of operators. The OCC prevailed on every issue.

Finally, with enforcement rules in place and rules for creating and managing surface waste facilities operative, the OCD addressed the Pit Rule. We held four public meetings in the oil and gas producing regions of the state, and then convened a professionally facilitated "task force" made up of industry representatives, environmental groups, the OCD, ranchers and representatives from local governments. This group met for over 3 months to hammer out a rule to present to the OCC for adoption.

The OCC held 18 days of hearings and 5 days of deliberations which resulted in the passage of a final rule. The pit rule became effective on June 16, 2008, and while it remains controversial and has been appealed by a small group of operators, it has also proven to be very effective. As of August 2010, there has not been a single ground water contamination event recorded at a site covered by the rule.

Q. THOSE WERE THE PIT RULE HEARINGS YOU DESCRIBED?

A. Yes.

Q. FROM YOUR INVOLVEMENT, WHAT APPEARED TO BE INDUSTRY'S GREATEST CONCERN WITH THE RULE?

A. During these hearings, one of the major issues raised by the industry representatives was the cost of compliance with the new rule. Mr. Tom Mullin, a witness for the Independent Petroleum Association of New Mexico, testified that his typical costs of drilling would increase by about $35,000 per well,[1] and that this would reduce his expected rate of return on investment from 29% per year per well to just 24% per well per year.[2] This analysis was pertinent to Fruitland Coal development[3] which is some of the shallowest, least expensive drilling in the state.

Mr. Larry Scott, a partner in Lynx Petroleum, and another witness for the IPANM, testified that his company drilled one to three 10,000 to 12,000 deep Morrow gas wells every year,[4] which is some of the deepest, most expensive drilling in the state. Mr. Scott testified that he had drilled two similar wells in the same area, one with a conventional pit and one with a closed loop system and waste disposal[5] as would be required in some conditions under the new rule, and that the incremental cost was approximately $150,000 or about 8% of the total investment in the well.[6]

After the testimony of Mr. Scott and Mr. Mullins, Mr. Bob Gallagher, then the President of the New Mexico Oil and Gas Association, testified that he had the "actual bills" for the cleanup of 5 "legacy pits" in the Central Vacuum Unit that amounted to

---

[1]Transcript of Pit Rule hearing (T) Page (P) 3302 Lines (L) 20-24
[2] T P3303 L17-20
[3] T P3306 L3-4
[4] T P3279 L15-17
[5] T P3279 L18-22 and T P3286 L17-20
[6] T P3279 L23-24

$259,000, $242,000, $250,000, $230,000 and $250,000 respectively.[7] A point here is that these pits were "legacy pits," meaning that they had been abandoned under prior rules and that additional action was required due to contamination issues. But these costs were incurred *prior* to the implementation of the Pit Rule. The combined testimony of these three witnesses supported two OCD arguments: (1) the Pit Rule's objective of minimizing the number of "legacy pits" that must be remediated is valid; and (2) the cost of preventing the contamination (a maximum of $150,000) is significantly less than the cost to remediate an inadequately closed pit ($250,000).

Despite the testimony of their industry's associations, the industry began to parrot the $250,000 per well for each and every well as the additional cost to comply with the Pit Rule. The number was repeated by representatives of both of associations, as well as legislators and political candidates, including a gubernatorial candidate.

The OCD's estimate of the compliance cost was and continues to be significantly less than stated by the industry witnesses, and recent experience and innovation, such as the use of roll-on/roll-of boxes, have reduced the cost of compliance even further. But an even more telling statistic is the fact that since the Pit Rule was implemented on June 16, 2008, the regulated community has not reported a single new case of groundwater contamination.

[7] T P4673 L11-17.

Q: HAS THE INDUSTRY RAISED OTHER CONCERNS ABOUT THE PIT RULE?

A: Yes. A related issue that is raised repeatedly about environmental regulation and the Pit Rule in particular is that any regulation "will add costs to natural gas production," and that "the [San Juan] Basin will suffer steadily decreasing production as a result of annual mandated GHG emissions reductions."[8] In fact, natural gas production in the Basin will decline over time *because the resource is contained in a pressure depletion system in a mature petroleum province.*

Basin gas production was declining when the price of gas and economic incentives made coal bed methane (CBM) a viable product. Now that CBM production has peaked, the forecast is for future declines in production rate unless and until technological innovation, such as horizontal drilling, or a major positive price change influences the curve. Drilling can, and will, reduce or temporarily reverse the rate of decline. But eventually, as the reservoir pressures deplete and the number of wells increases, the incremental cost to retard the decline by drilling will exceed the value of the increased production and the decline will begin. The date that this occurs will be governed by the price of the product produced to a much greater extent than the costs of environmental compliance.

As Martha Cather and Aili Luo wrote in a recent report for the Legislative Finance Committee, "Production of natural gas in NM has experienced an accelerated decline in recent years. The main factor in its decline is the natural decline in gas reservoirs, but certain other factors accelerated the declining trend, including gas prices,

[8] Testimony of Bruce A. Gantner, p. 3 ll. 12-15.

market demand and drilling activities....The significant increase in shale gas production in the northeast [U.S.] region led the shrinkage of gas demand outside New Mexico. The declining demand stimulated the fall in gas prices in New Mexico, and caused a decline in drilling activities leading to an accelerated decline in gas production."[9]

Another statement often repeated by industry representatives in attacking environmental regulation in general and the Pit Rule in particular is that "the Pit Rule is running drilling out of the state," or "the Pit Rule is responsible for the decline in the rig count." But facts don't bear this out. The industry is currently running an advertising campaign with the tag line "Energy Advances New Mexico". The statistics used in these advertisements are taken from a report on the campaign's web site entitled *Economic Impact of New Mexico's Oil and Gas Industry* by C. Megan Starbuck, Ph.D. Dr. Starbuck reports that on July 31, 2008, the month after the Pit Rule was enacted, the Baker Hughes rig count reported that NM had 4.31% of all the active rigs in the U.S. operating and that one year later, while both the U.S. and the New Mexico rig counts had declined, NM still had 4.32% of all the rigs operating. Dr. Starbuck presented these statistics in another way: over this period, the U.S. rig count dropped 51.41%, but the New Mexico rig count dropped only 51.19%.[10]

A further examination of the Baker Hughes rig count data adds credence to the argument that fluctuations in drilling rig activity in New Mexico are almost totally controlled by the prices of oil and gas (or the expectation of prices) rather than small changes in compliance costs. In June 2008, on the day that the Pit Rule became effective,

---

[9] Cather and Luo, *A Statistical Analysis of Natural Gas Production in New Mexico and its Impact on the New Mexico Economy*, Petroleum Recovery Research Center, New Mexico Institute of Mining and Technology, June 30, 2010.

[10] Starbuck, *Economic impact of New Mexico's Oil and Gas Industry*.

the Baker Hughes rig count was 76 rigs operating in New Mexico. Over the next 11 weeks, the count climbed to 97, and stayed above 90 rigs operating for an additional 11 weeks. During this same period of time, the price of oil at the Artesia Refinery plunged from nearly $130.00/bbl to below $60.00/bbl, and the rig count finally reacted to the price and dropped drastically after that. But it was the price, and not the Pit Rule that caused the decline.

Q. HAVE OIL AND GAS PRICES STABILIZED IN NEW MEXICO?

A. Yes, at least for now. Oil prices have been at or above $70.00 per barrel and gas prices have been holding at over $4.00 per MMBTU for almost a year.

Q. HAS THE STATE SEEN ANY INDICATION OF FUTURE ACTIVITY SINCE THE PIT RULE WAS IMPLIMENTED OVER TWO YEARS AGO?

A. Yes. One indication is the amount of money collected by the State Land Office (SLO) for new lease bonuses in their monthly lease sales. The bonus is the amount paid by operators to acquire the initial rights to drill on state land. During the fiscal year that began in July 2009 and ended in June 2010, the SLO collected almost $73 Million. This exceeds the prior record of $61 Million in Fiscal Year 2006 by nearly 20%, and almost doubles the previous year when prices collapsed.

Q. WHAT OTHER INDICATIONS DO YOU SEE OF DRILLING ACTIVITY AFTER THE PIT RULE?

A. Two of the most important indicators are the recent sale of an independent producer operating exclusively in Southeast New Mexico and the purchase of the BP assets by an active independent operator.

After spirited bidding from several suitors, Marbob sold its assets to Concho Oil and Gas for a significant premium over the value of the production itself. In a press release published in *The Oil and Gas Journal* on July 20, Concho announced, under the headline "Concho will hike activity on Marbob Assets", that one of the factors in the purchase was 2,300 identified drilling locations.

And recently, BP announced the sale of its Permian Basin assets to Apache. Prior to the acquisition, Apache had already announced that they intended to drill 100 new wells in New Mexico this year.

Q. WHAT CONCLUSION DO YOU DRAW FROM THESE EVENTS?

A. I conclude that (1) in estimating their costs to comply with environmental regulations, the oil and gas industry has a tendency to overestimate those costs and underestimate their ability to adapt and innovate to minimize those costs; (2) drilling activity in New Mexico is very dependent on the price of the commodity and the perception of the industry as to the direction of those prices. While environmental compliance costs will have an effect on drilling activities, that effect is dwarfed by pricing and pricing expectations; and (3) drilling in New Mexico is very attractive to

savvy companies and that the opportunity to drill here still draws significant capital, even when compliance with environmental regulations, including the Pit Rule, is required.

III. THE EFFECT OF IMPLEMENTING ENVIRONMENTAL REGULATIONS ON INVESTMENT DECISIONS OF OIL AND GAS OPERATORS IN A VOLaTLE COMMODITY PRICING ENVIRONMENT

Q: ASSUMING THAT COMPLIANCE WITH THE STATE'S PROPOSAL WILL INCREASE THE COST OF DRILLING AND PRODUCTION, HOW WILL THAT AFFECT DRILLING ACTIVITY IN NEW MEXICO?

A: Adding to the cost of anything will decrease the amount of it that gets done, but if the reward is sufficient and the risk is low, companies will make the investment to develop the resources. New Mexico is one of the mature petroleum provinces and sees relatively little exploratory drilling. Most of our drilling is classified as development drilling. That is one reason that Marbob sold for the premium that it did. There are 2,300 identified drilling locations where a purchaser can invest its money quickly at very low risk.

Apache's purchase of the BP assets is another example of the same phenomenon. BP was not going to commit the assets necessary to develop these properties and therefore the opportunity value to BP was low. Apache, on the other hand, saw the opportunity to balance the risk associated with high risk capital intensive projects in other locations like Egypt and Canada, with the relative security of predictability in New Mexico. The New Mexico oilfields are a place to invest relatively low risk money and earn a predictable, relatively high rate of return. If a company is positioned to take advantage of these conditions, drilling here is very lucrative.

After the predicted price of the product, the biggest factor in a company's decision to drill is the risk associated with the project. The third most important factor is the size of the recoverable reserves and the associated production rate.

As an engineer for three different companies, I would often model economic decisions and run sensitivity analyses by changing three factors: the price of oil and gas; the chance of success (risk); and the size of the recoverable reserves. Occasionally the capital costs of the project would be an important factor and operating costs would sometimes enter into the analysis, but since they were much more predictable than the other three, they were most overwhelmed by the changes in those other factors.

Q: HOW WOULD YOU CLASSIFY COSTS ASSOCIATED WITH THE PROPOSED RULE?

A: The costs of compliance could be broken into two types; first is the initial costs, usually capital costs, and second is the recurring operating costs. Dollar for dollar, the initial costs will be of greater concern to the industry due to the fact that they will be incurred at time zero. This is important because the decisions the operator makes will be based on the time value of money, and an initial expenditure will have a greater negative value than operating costs that can be spread over the life of the well, at least on a dollar-for-dollar comparison.

Q: HOW WILL THE RULES CHANGE THE RECOVERABLE RESERVES FOR A WELL OR PROJECT?

A: If costs do increase, there will be a very low percentage reduction in recoverable reserves for three reasons: (1) some producing projects will not bear the cost of the initial investment necessary to comply; (2) increased operating costs will render some projects uneconomic earlier in their life than would otherwise occur; and (3) some marginal projects will not be drilled or constructed.

The first category contains projects that contribute little or nothing to the income of the company because they are producing essentially at the economic limit. These projects would be abandoned at the next equipment failure or major expense, and are generally carried on the books at minimal reserves.

The second category is only slightly better than the first and may appear undistinguishable from the first to the operating manager. These projects will bear the initial cost of the installation of the equipment at the current operating costs, but the increased operating costs will make the project uneconomic earlier in its life and leave some reserves in the ground. Again, these projects provide very little income to the company and their reserve contribution is very limited after this point.

The third category is more problematic. This is mobile money that can be moved and invested elsewhere. But again, the projects that will fail in this category are the ones with the least potential for income to the company and the lowest rate of return. They also make the least contribution to the reserves of the state and the company. But if a relatively small change in the capital or operating costs would cause these projects to fail, the sensitivity analysis to major unknowns like future oil and gas prices, the chance of

success, and the reserves estimates would have rendered this project questionable without the addition of the costs of complying with the rule.

Q: WILL THE COSTS OF COMPLIANCE CHANGE THE OPERATORS DECISIONS WITH RESPECT TO DRILLING IN NEW MEXICO?

By drilling in the mature petroleum province of New Mexico, an operator can minimize the risk associated with the expected reserves and the chance of success, but the major unknown, the price of oil and gas, is neither accurately predictable nor exclusive to New Mexico. In an economic analysis, the risk associated with the commodity price would completely dominate the small change in a known parameter, in this case the costs of complying with the rule. New Mexico provides an operator a chance to control two of the three major risk factors in an investment, and while a cost increase will cause fewer wells to be drilled, the actual number will be so small as to be indistinguishable in the noise of fluctuating prices.

MARK E. FESMIRE, PE, JD

3196 Renaissance Dr. SE
Rio Rancho, New Mexico 87124
(H) 505-896-2601
(W) 505-476-3460
e-mail GasLaw4@Yahoo.com

BACKGROUND SUMMARY

Licensed Attorney and Registered Professional Petroleum Engineer with nearly thirty years experience in law, engineering, management and natural resources regulation. Currently serving as Chairman of the New Mexico Oil Conservation Commission, Director of the New Mexico Oil Conservation Division, New Mexico State Petroleum Engineer and as an Adjunct Professor of Oil and Gas Law at the University Of New Mexico School Of Law.

EDUCATION

TEXAS TECH UNIVERSITY SCHOOL OF LAW

Lubbock, Texas. August 1990 to May 1993. J.D. awarded May 1993.

- Recipient of the Richard W. Hemingway Presidential Scholarship in oil and gas law.
- Class Rank 80th of 199.

TEXAS TECH GRADUATE SCHOOL OF BUSINESS

Lubbock, Texas. January 1979 to May 1980. Completed 28 hours towards MBA.

- GPA 3.39 of 4.00

NEW MEXICO STATE UNIVERSITY

Las Cruces, New Mexico. August 1974 to May 1978.

- B.S. Geological Engineering. May 1978.
- B.S. Civil Engineering. May 1978.
  - GPA 3.07 of 4.00

PROFESSIONAL LICENSES AND RATINGS

LAW LICENSES AND RATING

- Texas Bar #00787462
- New Mexico Bar #11884
- Martindale Hubble rating (1999) BV

ENGINEERING LICENSES

- Texas #60756
- New Mexico #8552
- Michigan #35833

EXPERIENCE

University of New Mexico School of Law
Albuquerque, New Mexico, August 2009 to present
Adjunct Professor of Oil and Gas Law
Teach Oil and Gas Law to third year law students.

New Mexico Oil Conservation Division
Santa Fe, New Mexico. May 2004 to present.
Chairman of the Oil Conservation Commission, Director of the Oil Conservation Division, New Mexico State Petroleum Engineer. Personally responsible for the regulation of all production and environmental aspects of the 10 Billion dollar per year New Mexico Oil and Gas and Geothermal power industries. Position requires direct supervision of more than 70 professionals in four locations across the state.

- Chair the three member Oil Conservation Commission which is charged with creating, amending, and enforcing the regulatory rules governing production and environmental aspects of the Oil and Gas industry in New Mexico.
- Manage all internal organization, staffing, policies, budgeting, and performance tracking for the New Mexico Oil Conservation Division.
- Responsible for the regulation of the transportation and disposal of oil field wastes in the state.
- Responsible for the State's federally mandated Underground Injection Control program.
- Represent New Mexico on the Interstate Oil and Gas Compact Commission, including a seat on the nine-member Steering (executive) Committee and the chairmanship of the Public Lands Committee.
- Recipient of the 2010 Conservation Hero Award presented by the Conservation Voters of New Mexico for environmental improvements in the oilfields in New Mexico.

New Mexico Office of the State Engineer
Legal Division
Santa Fe, New Mexico. October 1999 to May 2004.
Chief of the Hydrographic Survey Bureau. Managed the Hydrographic Survey Bureau of the Legal Services Division of the Office of the State Engineer. Position required direct supervision of more than thirty professionals in two locations. Represented the Water Rights Division in contested administrative hearings and managed multi-million dollar professional services contracts and budgets.

- Managed the conversion of the Hydrographic Survey Bureau from a primitive paper map and file based organization to an extremely sophisticated GIS (Geographic Information System) based modeling and data base operation that has received two major national awards for GIS proficiency and innovation.
- Drafted RFPs, conducted selection process, draft and manage the contracts for approximately $8,000,000 in professional services contracts.
- Managed all internal organization, staffing, policies, budgeting, and performance tracking for the Bureau.
- Performed the legal review of proposed statewide administrative regulations.

Mark E. Fesmire, Attorney at Law
Lubbock, Texas. October 1995 to October 1999.

Attorney practicing in the fields of State and Federal Litigation, Oil and Gas Law, Administrative Law, Environmental Law, Criminal Law, Bankruptcy Law, Water Law, Construction Law, and Contracts Law.

- Negotiated and handled the legal and technical aspects of the liquidation of bankrupt oil and gas companies.
- Civilian co-chairman of the Reese Air Force Base Restoration Advisory Board for two terms. Co-chaired the board that oversaw the environmental restoration planning of the Air Force Center for Environmental Excellence and the Base Realignment and Closure Commission during and immediately after the closure of Reese AFB.
- Defense counsel in five death penalty capital murder trials.
- Represented the plaintiff in Federal litigation against the Secretary of Agriculture challenging administrative appeals procedures in Federal farm programs. Client was awarded all relief requested upon Motion for Summary Judgment. The award included all attorneys' fees.
- Represented Bankruptcy trustee in extensive Federal litigation arising from the administration of business and personal bankruptcy estates and environmental rehabilitation of bankruptcy estate properties.
- Acted as Court-Appointed Special Prosecutor representing the State in over 130 felony and misdemeanor criminal cases in which the District Attorney's Office was barred from prosecuting due to legal and political conflicts of interest.

Lubbock County Criminal District Attorney's Office
Lubbock, Texas. August 1994 to September 1995.

Prosecuting Trial Attorney. Attended the Southern Environmental Enforcement Network Prosecuting Environmental Crimes Course in New Orleans.

El Paso District Attorney's Office
El Paso, Texas. December 1993 to August 1994.

White Collar Crimes *Prosecutor*.

AA Production, Inc.
Lubbock, Texas. October 1992 to December 1993.

Law Clerk to Corporate Counsel and Land Departments of Oil and Gas Production Co.

McWhorter, Cobb and Johnson, L.L.P.
Lubbock, Texas. May 1992 to April 1993.

Law Clerk in Oil and Gas, Litigation, and Bankruptcy Sections of an eighteen-attorney law firm.

Wagner and Brown Oil and Gas Producers
Midland, Texas.

Chief Reservoir Engineer	*January 1987 to August 1990.*
Reservoir Engineer	*June 1985 to January 1987.*

Duties included petroleum and civil engineering, economic evaluation of capital investment opportunities, cash flow forecasting, budgeting, cost estimation, supervision of engineers and engineering staff, acting as an expert witness in five major lawsuits, and acting as an expert witness in regulatory hearings before state regulatory bodies.

- Performed the economic and cash flow analysis of oil and gas property acquisitions and sales, including the purchase of two companies, Coseka U.S.A. Oil and Gas, Ltd. and Longhorn Oil and Gas, Inc.
- Calculated the value lost to my employer by drainage in a major field due to pipeline curtailment. Defended this calculation in court when my employer sued the pipeline company. We were awarded approximately $7,000,000 to compensate for these losses.
- Conducted a drilling density study on the 300 well Conger Penn Field in Sterling County, Texas. This study resulted in drilling ninety-nine (99) additional producing wells with a total investment of $37,500,000. This project has been completed and is performing as projected.

Anadarko Production Company, Inc.
Midland, Texas.

Senior Production and Reservoir Engineer *1981 to 1985.*
Production Engineer *1980 to 1981.*

Duties included design, construction and operation of water supply; injection and disposal systems for secondary recovery operations; supervision of engineering and field staff; economic evaluation of capital investment opportunities; and testifying as an expert witness before state regulatory agencies.

- Designed, bid, and supervised the construction of three major injection water supply systems and one salt water disposal system in Southeast New Mexico and West Texas.

Texaco, Inc.
Sundown and Andrews, Texas.

Area Engineer *1980.*
Field Engineer *1978 to 1980.*

Duties included design, construction, drilling and operation of production, water injection and disposal wells and systems; supervision of engineering and field staff; and economic evaluation of investment proposals.

U.S. Bureau of Reclamation
Farmington, New Mexico. 1976 to 1977 (during college).

***Construction Inspector and Tunnel Surveyor**, Navajo Indian Irrigation Project.*

Western Geophysical, Inc.
Offshore Gulf of Mexico. 1973 to 1974 (prior to college).

Offshore Geophysical Observer.

RECENT PAPERS AND PRESENTATIONS

National Academies of Science Division of Earth and Life Studies Management of Coal Bed Methane Development and Produced Water in the Western US. Santa Fe, New Mexico, June 2009.

Harvard University Law School, Center for the Environment, Overcoming the Legal and Financial Obstacles to Deployment of Carbon Capture and Sequestration, Cambridge Mass. Panelist, March 30, 2009.

American Public Power Association and **American Water Works Association** (joint meeting), Potential UIC Issues Associated with Geologic Sequestration of Carbon Dioxide, Denver Colorado, September 15, 2008.

CLE International New Mexico Water Law Institute, Geologic Sequestration and Ground Water, Albuquerque New Mexico, August 1, 2008.

Platt's Carbon Capture and Sequestration Conference, Ownership of the Pore Space and the Right to Geologically Sequester CO2, Houston Texas, June 26, 2008.

International Energy Agency CCS Regulators Network Meeting, US State Prospective on Property Rights Associated with Geologic Sequestration, Paris France, May 14, 2008.

Santa Fe Geological Society, A Blueprint for the Regulation of Geologic Sequestration of CO2 in New Mexico, Santa Fe New Mexico, February 19, 2008.

Ground Water Protection Council UIC Meeting,; A Blueprint for the Regulation of Geologic Sequestration of CO2 in New Mexico, New Orleans La.., January 15, 2008.